

Resins Roundtable

Resins Suppliers Navigate in Uncertain Time

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The rapidly evolving market conditions for paint and coating resins have left many manufacturers in a difficult situation. High raw material costs and shortages of key commodity chemicals and other ancillary goods such as steel and aluminum have already begun to have a significant impact on the industry. These economic factors and the recent exemption of tertiary butyl acetate have diminished the impact of ever-increasing VOC restrictions and other regulatory pressures as the main issue for the coatings industry. Most analysts do not expect the conditions to be alleviated in 2005. Suppliers of resins to the paint and coatings marketplace must react quickly and decisively in order to remain successful during this challenging period.

All of this turmoil has happened against a backdrop of major acquisitions activity in 2004 that has also contributed to a changing landscape of the coating resins marketplace. Apollo Management purchased the resins business of Eastman Chemical. The Lubrizol Corporation acquired Noveon Inc., Cytec Inc. expects to close soon on its deal for UCB's Surface Specialties business, New Zealand's Nuplex bought Akzo Nobel's Coating Resins operations, and DSM recently announced that it

has agreed to acquire Avecia's NeoResins business.

Apollo Management greatly increased its holdings in resins for coatings when it acquired Eastman's acrylate ester monomers, composites (unsaturated polyester resins), inks and graphic arts raw materials, liquid resins, powder resins, and textile chemicals businesses for \$215 million. Apollo previously acquired Shell's resins business and named it Resolution Performance Products. The Eastman operations have been named Resolution Performance Materials, raising the question as to whether or not Apollo will combine the two into one entity. Such a company would have annual sales of about \$1.6 billion and be well positioned in most resin technologies. Apollo also acquired Borden Chemicals in 2004. "Apollo Management's roll-up of three fairly different resin businesses is the most significant because it shows a private equity play that seems to be building scale and not just tearing cost from the target," notes Michael D. Brown, vice president of The ChemQuest Group, a management consulting firm located in Cincinnati, OH.

The Lubrizol Corporation acquired Noveon International for \$1.84 billion in June 2004. With the addition of Noveon, the corpo-

ration's product portfolio includes additives for transportation and industrial lubricants; additives and specialty resins for paint and coatings; inks and graphic arts; electronics; specialty paper and adhesives; ingredients for personal care products, food and beverages, and compounds used in the manufacture of specialty plastics. The Noveon division will concentrate on specialty chemicals and materials for myriad uses and will include two businesses geared towards the coatings industry—Resins & Polymers and Specialty Additives—each with its own set of technologies and application areas. The acquisition makes Noveon one of the world's largest suppliers of both additives and specialty resins. "The combining of Lubrizol's and Noveon's coatings businesses was not just a combination of product lines; it was a melding of technology and capabilities, a balancing of geographic coverage, and the building of a broader, more valuable set of solutions for the customer," says Jim Stephanadis, global business director, Resins & Polymers, Performance Coatings, within the Noveon division.

Cytec is buying the Surface Specialties business of UCB for \$1.8 billion, which will more than double the sales of the company from approximately \$1.5 billion to \$3.3 billion. Cytec will maintain the same organizational structure, with Ben Van Assche remaining CEO and headquarters staying in Belgium. For Cytec, the acquisition provides "critical mass" and a broad base of technology in both resins and additives for the coatings industry and other markets, according to the company. "Cytec's acquisition is interesting in that two resin suppliers of 'crosslinking' technology have combined to provide a bigger, more diverse offering," says Mr. Brown. "Rumor is that they will combine the melamine businesses of both and spin the combo off into a new company—a rather significant move within the automotive OEM coat-

ings value chain where these materials are a key ingredient."

New Zealand coating and ink resins company Nuplex Industries has agreed to purchase the Coating Resins business of Akzo Nobel for \$137 million. Akzo's UV/EB Resins business has been sold to Cray Valley, and its Printing Ink Resins merged with the Pine Specialties business of Eka Nobel. Akzo will use the proceeds to improve its cash position and "create room to maneuver," according to the company. Nuplex has made several acquisitions in 2004 and invested heavily in China as well, including the purchase of Chinese resin manufacturer Foshan Veeya Chemical. The acquisition of Akzo Nobel Resins will transform Nuplex from a strong regional player into a major resin manufacturer with a strong position in emerging markets in Asia.

DSM announced in December that it has agreed to purchase Avecia's NeoResins business for \$681 million. NeoResins, which will be incorporated into DSM's Coating Resins group, will provide synergies in technology, markets, innovation, and purchasing, according to the company. DSM Coating Resins also agreed earlier in 2004 to acquire industrial coatings manu-

facturer Hüttenes-Albertus Lackrohstoffe (Hal), a part of Hüttenes-Albertus Chemische Werke.

Several representatives of the coating resins industry discussed the state of the market with JCT COATINGS TECH. Their comments are presented below. Participants included: Steven Nerlfi, a consultant with market research firm Kusumgar, Nerlfi & Growney; Michael D. Brown, vice president of management consulting from The ChemQuest Group; Henry Bunch, business director of EPS/CCA; Phil Charbonneau, director—America, with Synthomer; Carlo Spaniol, global marketing manager for coatings with Dow Epoxy Products & Intermediates; Lee Orr, commercialization manager for coatings and inks with the United Soybean Board; Bill Sparks, business manager, Functional Polymers, for BASF; Cindy Fruth, market manager and Greg Ross, sales manager, both with Johnson Polymer; Deborah Hensley, global business manager for resins within the paint and coatings business and Jim Stephanadis, global business director, Resins & Polymers within the Performance Coatings Group of The Lubrizol Corporation's Noveon business division; Wim Vanderghinste, market manager Radcure—Industrial Coatings Americas for Surface Specialties UCB; Robert Skarvan, sales and marketing services manager for Akzo Nobel Resins; and J.R. Rusty Johnson III, North American marketing manager, architectural binders, with Rohm and Haas Company.

JCT: *What are the major issues facing coating resins manufacturers today? What are the challenges and opportunities that these issues pose? How is the industry responding?*

Steven Nerlfi, Kusumgar, Nerlfi & Growney: Rising energy, raw material, and transportation costs have



Photo courtesy of Lyondell



Photo courtesy of Refim and Haas.

meaning they could be with us for some time.

Henry Bunch, EPS/OCA: We agree that pricing of raw materials and availability of select materials are the primary factors affecting the industry today. We have seen prices increase over the past two years, and, in the past several months, these increases have accelerated

and allocations for acrylic monomers have been enforced. All indications are that this will continue in 2005 as significant increases were announced for January 1 and order control limits are getting tighter. We have been forced to react in kind, with pricing increases and potential order control. Since the shortages are global in nature, it will be incumbent on monomer producers to increase output to turn this situation around. The only other alternative is that escalating prices diminish demand to fall in line with the available supply.

Phil Charbonneau, Synthomer: Monomer availability is a continuing challenge for the industry but there now seems to be a light at the end of the tunnel, albeit not a bright light. When it comes on, additional raw material availability will help to stabilize market prices. Obviously an ongoing weak U.S. dollar complicates the issue and I don't see a strengthening USD anytime soon. The good news is that in turbulent times there are opportunities for companies to redefine themselves as they adjust to market conditions. Strong companies will get stronger, weak companies will get weaker (or simply go away), and the niche players will have to redefine their niche.

Carlo Spaniol, Dow: The stronger than expected economic recoveries

in 2004 have resulted in demand growth higher than the historical trend line of 4-5% globally. We expect ongoing strong demand from all sectors and regions as we move into 2005. Due to this continued growth and the fact that no significant new capacities have come on-stream, there is a tight supply/demand balance that is placing upward price pressure on resins. The market will need time to build new capacity in order to address the current imbalance, by bringing supply in line with demand.

In addition, persistently high oil prices and stronger demand in other segments have affected the availability and prices of intermediates for epoxy resins. The result is that margins have been significantly eroded to unsustainable levels. Stronger margins are needed to support the investments that will increase industry supply capabilities. Unfortunately, we do not see any immediate relief on hydrocarbon costs or industry balance. We expect the market to remain tight for the short to medium term.

Cindy Fruth, Johnson Polymer: Raw material costs and limited availability will cause resin producers to change how they promote and position technologies. The reality that some technologies cannot be "afforded" may happen. It may also force more coating activities to lower labor cost markets. We are already seeing this trend as companies start operations in Asia. Customers of the coating resin suppliers need to raise their prices to help move the industry back to health. They need to educate their customers on the issues facing the coatings market. For example, OEM manufacturers like the Big 3 automakers are demanding reductions year after year, which squeeze the margins for the coating manufacturer.

Jim Stephanadis, Noveon: Similar issues and problems existed in the mid-to-late 1970s. Care must be taken by the industry that reaction

reduced profit margins to minimal amounts for resins manufacturers, who up until recently have had difficulty pushing through price increases. Paint formulators have traditionally had the largest profit margins in the industry, and resin producers need to educate the paint companies on the untenable situation that exists today. Paint companies will eventually have to accept the increases because they do not want to sacrifice the long-term relationships that they have built with their resin suppliers.

Michael D. Brown, The ChemQuest Group: The economy has become the major issue for the paint and coatings industry and its suppliers. Recent shortages and price increases are troublesome in a market known for thrifty buyers. The acrylic chain, and acrylic acid in particular, is in very tight supply. Steel is also in demand. Plants are running at full capacity and cannot meet the ever-growing demand from Asia, where OEM production has been shifting. Everyone is competing for material from existing sources in Europe and North America. Some of the shortage may be attributable to the lengthy supply chain, but there is a growing middle class in China and India that is very likely increasing its demand for goods and services. Therefore, it appears that the shortages are rather structural in nature.

does not lead to a rapid expansion of capacity or we will rapidly fall back into a situation of oversupply and prices falling back through the floor. In addition to the regional regulation issue, changing world economies are heavily impacting supply and demand—China, for example.

Bill Sparks, BASF: While raw material pricing and supply imbalances are crucial issues, regulatory pressure also remains a significant issue for the industry. It is a great concern that the regulations are not uniform across the country. Paint companies will have regional formulations where the lower VOC limits cause a significant compromise of performance; this will add complexity and cost. The paint consumer is not cognizant of VOC regulations; however the technologies which make low-VOC possible also enable paint manufacturers to make environmentally friendly paints, which are marketed for their "healthy" attributes such as low odor and low toxicity. Reducing organic solvents in paints is also an economically advantageous strategy especially when oil prices are at record highs.

Deborah Hensley, Noveon: We agree that regulations also are a prevalent issue. We need to consider all the major regions of the world, including Asia, and regulations vary depending on the region and the particular substance involved. So, for global companies, understanding and meeting these regulations is challenging. Finally, reducing VOC levels is an area of focus and something that, in part, is driving our product development.

Robert Skarvan, Akzo Nobel Resins: Clearly the most significant issue we are faced with as an industry is managing the bottom line in the face of exploding raw material costs. 2004 was a robust year from an overall demand standpoint; however, raw material cost escalation and supply concerns hugely over-

shadowed what normally would be considered a good year. As our customer base is faced with similar circumstances, the opportunity to provide them with value added solutions has become all the more challenging.

As globalization is a significant issue for the coatings industry, it is also a significant issue for the resin industry. As large OEM coating customers demand consistent, high quality supply to their factories in places like Asia and South America, global resin sourcing has moved into the spotlight as a critical issue. As a result, more than ever, coating chemists have to not only address potential global supply of new raw materials when putting together new paint formulas but also allow for the fact that raw material costs change daily!

Lastly, the resin industry is challenged to provide a wide variety of coating solutions in a constantly changing patchwork of global, national, and regional regulations. The recent allowance of tertiary butyl acetate as an exempt solvent and butyl cellosolve's removal from the Hazardous Air Pollutant (HAPs) list, all within the same month, exemplifies how quickly things change and resin manufacturers need to react.

Rusty Johnson, Rohm and Haas Company: Historically, sales of architectural paint mirror GDP growth rates, and 3–5% growth per year is good, especially if you consider that over the past 10 years the number of companies competing globally for the available business has increased. There is an excess of resin and paint capacity in the global market. Too much capacity chasing moderate growth demand

makes it difficult to generate growth and returns that keep the financial community/shareholders happy. Globalization also means there are more players vying for the same piece of the pie in each region of the world. Technologies move, products move, different loyalties and alliances are established, and most of this leads to more pressure to reduce costs and selling prices.

Industry consolidation of paint producers and outlets for paint has also impacted the architectural segment, leading to greater buying power in the hands of a few, which drives margins down. Lastly, the segmentation of the architectural paint market has shifted from being dominated by do-it-yourself business to contractor business. Currently, the paint company and company owned stores own the contractor segment, while the big boxes and mass merchandisers are struggling to try and gain share of the contractor segment. This struggle for market share at times causes paint companies to delay increases in paint prices even though they may be sorely needed in order to maintain market share.

JCT: *What do you see as the major growth areas for coatings resins? What are the drivers?*

Carlo Spaniol, Dow: First of all, booming demand for ships and containers has triggered significant

U.S. Market for Coating Vehicle (Resins and Associated Crosslinking Agents)^a

Year	Volume, billion dry lb	Value \$ billion
1996	4.2	\$4.1
2001	4.57	\$4.44
2003	4.76	\$4.62
2004 ^b	5.0	\$4.71

(a) Source: Kusumgar, Nerlfi & Growney.

(b) Estimate.

Selected 2004 U.S. Resin Sales by Type^a

Resin Type	Volume, million dry lb	Value, \$ Million	Annual Growth Rate
Acrylics	925	1,350	3%
Alkyds	445	356	0 to -1%
Amino resin crosslinkers	335	94	1-2%
Cellulosics	31	59	-1%
Epoxy resins (all types)	380	475	2%
Polyester (all types)	275	261	4%
Urethanes (derived from various polyols, carbamates, aromatic and aliphatic isocyanates, prepolymers, TPUs, etc.)	240	600	3%
Polyvinyl acetates	640	992	1-2%
Polyvinyl chloride	240	156	0
Miscellaneous (about 40 resin types)	200	400	ave 2%
Total	3495	4743	ave 2%

(a) SOURCE: Kusuniger, Nerth & Growney.

growth in marine and protective coatings, most of it in Asia, where you find about 70% of the world's ship and container building capacities. China has become the #1 marine container manufacturer in the world and #3 in new shipbuilding. Epoxy resins consumption in marine and protective coatings has doubled in the last two to three years.

The other major coatings market for epoxy resins—powder coatings—has continued to grow strongly in Asia. However, we have also seen strong recovery in Europe and North America in the second half of 2004. Powder coating, widely used in household appliances (refrigerators, washing machines, air-conditioners, etc.) and in construction, grew 15–20% during the past two to three years.

Automotive and packaging coatings continue to show good growth rates in all regions, in line with overall GDP. Another strongly growing segment is UV-curable coatings, which has been growing above GDP over the last few years.

Wim Vanderghinste, Surface Specialties UCB: Productivity and VOC regulations remain the main

drivers for changes in coating technology.

Michael D. Brown, ChemQuest: All resins for architectural coatings will continue to be a strong area of growth as this segment benefits from the strong growth in housing (although I expect this to cool significantly after next year). Urethane resins (polyester polyols and isos) continue to grow in the OEM and Specialty sectors (auto refinish and industrial maintenance) as their costs come down and they are more competitive with the incumbent resins such as alkyds and epoxies.

Henry Bunch, EPS/CCA: We see primary growth continuing to occur in water-based emulsions at the expense of solvent-based resins. As technologies advance and regulations tighten, this trend will continue.

Deborah Hensley, Noveon: In addition to continued conversion from solventborne to waterborne coatings, UV technology will also be a major growth driver in the resins industry. There is also strong drive to get 2K performance with the convenience of a 1K system, and we see

an overall industry trend here. A 2K system usually provides superior performance (i.e., better scratch resistance, etc.) and 1K systems are more convenient and fool-proof to use.

Robert Skarpan, Akzo Nobel Resins: Geographic growth, most particularly in China and the rest of Asia, will be a main driver for the coating resins market. Europe's focus on waterborne has intensified for regulatory reasons and in the U.S., a shift to tbaac and butyl cellosolve as well as compliance issues related to California and the Ozone Transport

Commission (OTC) states will be major factors in 2005. UV growth and opportunities abound in the wood industry. However, as monomer and acrylic acid are in very tight supply, this growth has been somewhat constrained.

Rusty Johnson, Rohm and Haas Company: We believe that the reduced VOC regulations will spread beyond California's South Coast Air Quality Management District (SCAQMD) and California Air Resources Board (CARB) and the Mid-Atlantic/Northeast states. The repaint market will continue to be strong for years to come. While many of the new homes and buildings do not require paints when they are initially built, they all require painting after several years of exposure to the environment. All of the substrates being used to construct these buildings can be painted with a top quality 100% acrylic paint. Interiors are much the same. Especially in new home construction, the homes all start off some shade of white. After the first year everyone is decorating. Sales of new homes, re-sales, and changes in taste and styles will continue to drive the paint market.

Greg Ross, Johnson Polymer: The drivers for growth of coatings remain constant and include cost/efficiency, performance, and environmental compliance. In the U.S. and Europe, the three drivers are balanced. Depending on the resin technology, market, and application, one becomes more important than another (e.g., 50 g/l VOC in architectural). The growth areas are in lower VOC systems—assuming some balance of cost and performance can be maintained. In Asia, Africa, the Mideast, and Eastern Europe, the driver is cost, followed by performance, with environmental a distant third. There are exceptions to this general statement, like when a western customer dictates VOC-compliant technology use to an eastern supplier. However, these cases are very limited. Making and exporting stuff cheap is still the name of the game in these regions. This situation means a status quo for resin technology in these areas. Growth can occur for suppliers who successfully sell into these areas.

JCT: Where is the market headed over the next year? Next five years?

Wim Vanderghinste, Surface Specialties UCB: The drive is on for improved productivity coupled with the use of environmentally friendly technologies. This leaves a lot of room for growth in UV and waterborne technologies.

Phil Charbonneau, Synthomer: In the next year, companies will be addressing the monomer shortfall by continuing to increase price. Yield improvement is the name of the game right now.

Deborah Hensley, Noveon: Over the next year, we'll see resins producers and coatings producers continuing to work hard keeping up with the raw materials situation. This will likely continue through all of next year. The good news is that demand has remained strong and,

in the long run, higher material costs may actually make the industry healthier as reinvestment economics are attained throughout the supply chain. One interesting dynamic we've observed is that coatings producers are passing along price increases to mass market retailers—the same mass market retailers that used to wield all the power and keep prices down. Today's market dictates that producers can't always afford to supply them if the mass market retailers don't agree to shoulder some of the burden for some of these cost increases. Over the next five years, we expect to see more waterborne and low-VOC technologies and more innovation, particularly if the value of the whole market goes up, which will make it more conducive for capital investments in research to spawn some technological advances

Robert Skarvan, Akzo Nobel Resins: Over the next five years, strong growth, exceeding already strong GDPs, will continue for coatings and resins in emerging markets. Resin companies will need to provide uniform products and services to their expanding global customer base.

Domestically, at least for the next few years, architectural, industrial maintenance and marine, kitchen cabinet, coil, and automotive markets are expected to remain strong, primarily driven by construction growth and low interest rates. From a technology standpoint, solvent-

borne resin growth rates across these markets will be in the low single digits while waterborne growth rates will be more significant. Specialty waterborne product demand will be high as will the demand for improved 2K systems.

From a regulatory standpoint, over the next year the industry will see the expanded use of tert butyl acetate and continued opportunities to offer improved coating solutions for VOC-compliant coatings as well as for the California market. It will be most interesting to see how things pan out from a legal standpoint with Rule 1113, South Coast AQMD, NPCA, and the courts.

Rusty Johnson, Rohm and Haas Company: We expect that 2005 should be a good year for architectural coatings. Paint companies are introducing performance upgrades to many of their top 100% acrylic lines. Residential interior and exterior repaint should be steady. The U.S. Southeast will be rebuilding and recovering from devastation caused by the many hurricanes of 2004. These efforts will drive strong sales growth of paints and coatings through 2005. Mortgage rates will hopefully remain reasonable and therefore continue to support a strong real estate market, which will in turn generate turnover and coatings demand. Resin suppliers' reduced VOC offerings are being evaluated and scaled up to meet the SCAQMD 7/2006 50 g/l VOC requirements.

2004 Major Acquisitions in Coatings Resins^a

Acquirer	Acquiree	Purchase Price
The Lubrizol Corporation	Noveon	\$1,840 billion
Cytec, Inc.	Surface Specialties (UCB)	\$1,800 billion
Apollo Management	Eastman CASPI	\$215 million
Nuplex	Akzo Nobel Coatings Resins	\$137 million
DSM	NeoResins (Avecia)	\$681 million

(a) Source: JCT Coatings, Vol. 1, No. 11, 37 (2004).

It is much more difficult to predict the growth of the coatings resins market for the next five years. Perhaps the industry will achieve growth in line with GDP. Hopefully, some of our development programs will deliver improved performance that our customers will value and build into their new paints and coatings. I believe they will.

Carlo Spaniol, Dow: Over the next 18-24 months, market growth will exceed that of GDP, due to stronger than expected economic recoveries in 2004. Strong demand is expected to continue, driven by industrial investments and investments in the shipping industry (vessels, containers, et al).

All epoxy related markets (coatings, electrical laminates, civil engineering, composites, etc.) are exhibiting strong demand. We expect coatings demand to grow globally at 4-6% over the next 18-24 months. Strong economic recoveries, supply/demand ratios of upstream chemical feedstocks, combined with strong demand for epoxy resins, have led to a tight supply/demand ratio for epoxies that will remain into 2005. This will continue to put upward pressure on epoxy resin prices. China continues to be the fastest growing coatings market, as rising incomes have created higher demand for products that use epoxy resins, such as infrastructure, personal computers, mobile phones, and automobiles.

Steven Nerlfi, Kusumgar, Nerlfi & Crowney: Most resin manufacturers are building in China and Asia. OEM production is moving to this region, and coatings companies are following, so resin suppliers must be there to serve the market as well.

Michael D. Brown, ChemQuest: I see no major changes in the market, but more of the same. Private equity will continue to play a role in shaping the industry, probably for the better. At the five year point I think we can expect to see these firms spin off their resin holdings into independent companies with size and scale to be more competitive with Rohm and Haas.

JCT: *In more mature segments of the coatings market, what actions can producers take to ensure continued success?*

Steven Nerlfi, Kusumgar, Nerlfi & Crowney: In mature markets, companies need to focus on meeting the needs of the customer and developing novel materials that offer functionality and performance that the customer wants.

Robert Skarvan, Akzo Nobel Resins: Suppliers must constantly look for ways to help improve their customer's bottom line. The effort put

in and the resultant collaboration can often times be more important than the initial intentions. In spite of all the mega trends affecting our markets and customer base, the paint industry is still a people and relationship business. Trust, creative solution development, and dependability will always

be highly valued and are perhaps more important than ever. As raw material, energy, transportation, and virtually all other upstream costs for coatings and resins are up substantially, it has become even more important for suppliers to have global purchasing strength and resources in addition to a tremendous focus on eliminating unnecessary costs from their operations.

Wim Vanderghinste, Surface Specialties UCB: Producers must continue finding ways to differentiate and add value, or look at new segments where existing technology can provide added value. The last is especially true for UV/EB technology, which still only covers 2-3% of the overall coatings market. The key is finding applications where UV or EB technology can overcome technical hurdles and provide sufficient benefits for the end user (productivity, reduced VOC, cost-per-square-foot, etc.) that will make it attractive to change technologies.

Henry Bunch, EPS/CCA: Because of regulatory change, technology advances continue to play an instrumental role, even in mature markets. The recent regulatory changes, delisting EB for HAP compliance, and making t-butyl acetate a non VOC will slow this trend in the industrial markets. However, even those changes create shifts and, therefore, opportunities for companies positioned to capitalize on them. It should also be noted that a major shift in demand for EB and t-BA based on these changes will potentially have significant implications for price and availability.

Carlo Spaniol, Dow: Current industry regulations regarding VOC continue to play a major role in coatings formulations. Even in mature markets, producers need to be aware of regulations and continue to provide innovative solutions to help customers meet these regulations. Dow is committed to providing customers with differentiated technologies that support low-VOC formulations for coatings, and is working on innovative products that address VOC concerns.

Rusty Johnson, Rohm and Haas Company: More research dollars need to be spent on developing/finding new technologies that allow the paint companies to do what they are doing today at reduced costs without lowering performance. Furthermore, new technolo-



Photo courtesy of Rohm and Haas.

gies need to be developed that allow the paint/coatings manufacturer to improve the performance and push the bar up so that consumers will pay more for the improved performance/technology in the can.

JCT: *What is the importance, if any, of the size of a resin manufacturer? Why? How does size impact the way companies respond to market dynamics?*

Michael D. Brown, ChemQuest: Size is important especially in the acrylics segment due to the dominance of Rohm and Haas. R&H has economic scale upstream and at the polymerization points in the value chain which gives them a cost advantage. I believe the actions of Apollo in particular point to the importance of scale. There is also the argument that a supplier having a complete "market basket" of resins is a competitive advantage, but I have not seen this as important.

Steven Nerlfi, Kusumgar, Nerlfi & Grouney: Size of a resin company is a big factor. Larger producers have economies of scale, purchasing power for raw materials, more money for reinvestment, and more significant R&D efforts. Back integration in monomers is also a key advantage for resin suppliers, particularly in today's market with the existing shortages of raw materials.

Carlo Spaniol, Dow: The size of a resin manufacturer is not as important as its global presence. For example, Dow has nine manufacturing plants strategically located across all four major geographic regions. We are able to leverage the raw material advantaged sites in the U.S. and Europe to feed our manufacturing plants around the world. We are also able to provide local capacity in important growth regions like Asia Pacific.

Deborah Hensley, Noveon: Size can make a big difference from the standpoint of the segments a com-

pany pursues. A company's size can dictate its strategy in terms of what parts of the industry it sells into, as well as which geographies it targets. For Noveon, acrylics and urethanes are two big areas and we also have access to polymer technologies that aren't traditionally used in coatings.

This enables Noveon to be creative and resourceful in solving customer problems. It appears as though large companies don't really gain an edge on the raw materials scenario. It's really a matter of who was best prepared in terms of anticipating the need to leverage their supplier relationships to secure raw materials as things started getting tight.

Greg Ross, Johnson Polymer: Small, specialized regional suppliers compete on location, relationship, and relatively low costs (overhead, freight, etc.). They tend to have few local, loyal customers. Their size is not critical. Suppliers who try to participate on a national basis must deal with supply logistics (raw materials to their plant and product out). They must also compete with other national and international suppliers. Here, size is more important to have capacity and scale to compete. International suppliers must have a size and scale that allow them to compete with local, national, and international competitors. Similar dynamics for the national competitors apply, but with the added dimension that local competitors, especially in developing regions, are a real threat. I think at all levels, size of a supplier hinders the speed at which they respond to market changes. Depending on the change, they may be better or worse off in successfully responding.

Wim Vanderghinste, Surface Specialties UCB: More than size, the



Photo courtesy of EPS/CCA.

critical factor is to remain focused on the customer's needs and to address changes in the market quickly. Surface Specialties UCB has positioned itself to provide a wide range of environmentally-friendly coating technologies to cover diverse market needs on a global scale: UV/EB, powder coating, waterborne, UV waterborne, etc.

Robert Skarvan, Akzo Nobel Resins: As the resin market remains highly competitive and raw material cost and even availability are huge issues right now, economies of scale from a manufacturing and purchasing standpoint will continue to be of paramount importance. Companies that have global supply capabilities as well as global purchasing power will be in the best position to manage their supply chains. These same companies will also be in the best position to leverage global technologies and market know how. As they will naturally be larger in scale, they will be challenged and will need to react with the speed of a small company.

JCT: *Were there any significant technological advances over the past year? If so, what and why do you consider them significant? Anything expected in the near future?*

Steven Nerlfi, Kusumgar, Nerlfi & Grouney: Resin manufacturers must work with coatings formulators and

additive makers to design resins that will provide the functionality and performance desired by coatings producers. Efforts are largely focused on developing resins for coatings with higher and higher solids content that have more inherent functionality so that less coalescing agents and/or additives are necessary for achieving appropriate flow and leveling properties of the final coating formula. Resins with better pot life and application time are also being developed so that the end-user has more flexibility in applying the paint (easier to correct mistakes). Resins that provide less yellowing and better weathering capabilities are also in demand. Because there is a fairly set collection of monomers available for use in coatings resins, producers must rely on advances in polymerization technology that allow for the fine control evaluate of ratio and connectivity of the monomers to obtain resins with the desired properties.

Lee Orr, The United Soybean Board: One responsibility of the United Soybean Board is to oversee the development and commercialization of soy resins to be used in coatings, stains, and sealers. We represent the soybean farmers of

America and fund programs to grow soy use in coatings. In the last several years, there have been many developments in new soy-based resin technology for coatings and stains applications. New energy-saving soy-based roofing coatings have been developed to meet energy reduction initiatives. Soy-based stains and sealers are now available with deep penetrating power to provide long lasting performance on wood, cement, and fiber board.

The United Soybean Board continues to fund product development for new soy-based resins in architectural latex paints in order to provide low-VOC, low odor, cost effective resins. Work also continues to develop new soy-based resins which will meet proposed guidelines by the USDA for preferred procurement of bio-based products.

Wim Vanderghinste, Surface Specialties UCB: UV technology is starting to make a presence in the auto refinish market, with two to three coating suppliers making product launches now. While still in an early stage, the concept of using UV in a process where productivity—and especially process or drying time—is critical makes a lot of sense. In a different area, UV water-

borne technology is starting to break through in the wood market, again because of processing and regulatory benefits.

Robert Skarvan, Akzo Nobel Resins: Technical efforts in the last few years have produced significant advances in waterborne self crosslinking chemistries, alkyd and acrylic dispersion chemistries, and higher solids and higher performance acrylic polyols.

Michael D. Brown, ChemQuest: Speaking of nanotechnology, a small company named ElizaNor Polymers has produced core/shell resins with particle size at the nano-scale. These resins have very low viscosity and thus reduce the need for solvents (VOCs), yet have film properties comparable to more viscous higher molecular weight resins. The inside of the nanoparticle is made of high molecular weight polymers and is hard, while the outer shell is soft. The nanoparticles react when sprayed onto a substrate, releasing the high molecular weight resin. The patented technology has not yet been commercialized, and ElizaNor will most likely be looking for licensing partners when it is ready to launch.

RESINS — Supplier Roundup

- In 2004, Akzo Nobel Resins continued to expand its global reach by commissioning a state of the art resin plant near Shanghai, in Suzhou, China. Additionally, resin-manufacturing assets were purchased from Akzo Nobel Coatings in Sao Paulo, Brazil to support and expand its resin presence in South America. Globally, a number of new products were introduced, including new high performance self-crosslinking emulsions, water and solvent-borne acrylic polyols, rheology modified resins, and a number of new amino resins. "2005 will bring the exciting new combination of our business with New Zealand-based Nuplex Resins and continued efforts to 'Create the

Solution Together' with our customers around the world," says Mr. Skarvan.

- In addition to its multiphase latex products previously introduced to the market, BASF is continually working to improve and refine this technology platform. The company is investing in future opportunities for nanotechnology-based latex resins, and has demonstrated with early prototypes that nanoparticles can impart extraordinary strength and hardness with very low-VOC demand.
- In 2003, The Dow Chemical Company opened a converted epoxy resin facility in Zhangjiagang, China,

which enables the company to meet the needs of the fast-growing coatings market. "We continue to look at investment opportunities in China," says Mr. Spaniol. "We are evaluating our expansion strategy at the Zhangjiagang facility and are actively assessing the market situation to determine the appropriate timing and scope," he continues. At this point in time, Dow has no further announcements planned for additional epoxy resin facilities beyond its intentions in China.

Dow's research and development efforts are focused on discovering sustainable technologies in the areas of high-solids epoxy resins, low temperature curing resins for powder, marine, and protective coatings, and epoxy raw materials for waterborne coatings and other applications that require no solvents.

- **EPS/CCA** built a new grass roots emulsions plant in Hagerstown, MD, that came on stream in April 2004. This plant complements the company's existing plants in Illinois, California, and Texas, to provide full geographic coverage for North America.

EPS/CCA has introduced new technology in the area of water-based emulsions for masonry and cementitious substrates. These products offer outstanding efflorescence resistance, are excellent at adhering to partially cured (wet) substrates, and also offer hot tire and chemical resistance. The company also launched new patented internally coalesced emulsions that enable existing formulations to meet the new stricter architectural VOC regulations without sacrificing the use of glycol. This development allows formulators to maintain important properties such as open time and freeze thaw and still meet tough VOC regulations.

- **Johnson Polymer** continues to expand its self-crosslinking acrylic emulsion technology to improve chemical resistance and UV resistance. The company has developed low color polyols for the automotive refinish market that offer improved in-can color and UV and yellowing resistance.

- **Lyondell Chemical Company** commercialized its Acryflow™ line of acrylic polyols in 2004. These products are prepared in a proprietary process using hydroxy-functional allylic monomers. Unlike conventional acrylics, Acryflow polyols maintain their functionality at a low molecular weight. Consequently, coating formulators do not need to trade performance for lower VOCs. Also, unlike conventional polyols that are typically designed for a specific purpose, the six Acryflow polyols are designed to be blended together for use in a variety of applications including high-solids, UV, and moisture-curable coatings. This blending approach optimizes formulation latitude while reducing resin inventory costs, increasing coating performance, and lowering VOC content.

Lyondell also offers styrene allyl alcohol (SAA) resinous polyols and a line of polytetramethylene ether glycols (PT-MEG), known as Polymeg® polyols. The company is the



Akzo Nobel Resin's resin plant in Suzhou, China.

only large-scale global manufacturer and marketer of tertiary butyl acetate (TBAC™ solvent). Interest in this solvent for use in various coatings resins has increased greatly due to the U.S. Environmental Protection Agency's recent ruling excluding tertiary butyl acetate from the definition of a VOC.

- **Mace Co.** released a new line of nonhalogenated fire-retardant polyurethane dispersions (PUDs) that does not contain any traditional flame retardant additives like halogens, antimony oxides, borates, aluminum trihydrates, or phosphates. The company has also been developing PUDs that contain nanoparticles and NMP-free PUDs to meet the needs of the European marketplace.

Macekote HFR 321 is a fully reacted, aliphatic fire-retardant based on a hybrid polyurethane technology that is supplied as a fine particle dispersion in water. The product is a high performance, solvent-resistant polymer with excellent adhesion to difficult substrates like EPDM rubber and vinyl.

Macekote ST 444 is a low particle size, aliphatic, aqueous polyurethane that is part of Mace's new Smart series of resins engineered specifically for wood floor finishes and other similar markets where application techniques, substrates, and ambient conditions will vary. Even when handled by less experienced applicators in less than perfect conditions, finishes compounded with Smart urethanes have the best chance to properly defoam, flow, and level with good results. ST 444 is also a very hard urethane that will yield clear, glossy, dry films with good adhesion and superb alkali and solvent resistance.

Macekote NT 447 is an aliphatic, fine particle size, aqueous polyurethane that successfully incorporates nanotechnology for greatly enhanced chemical and abrasion resistance in high-performance wood finishes, automotive coatings, and similar applications. Coatings made with NT 447 consistently outperform single package urethanes as well as many crosslinked systems with superb alkali and solvent resistance and clear, glossy, dry films that are extremely hard but not brittle.

• In 2004, The Lubrizol Corporation acquired Noveon for \$1.84 billion. Noveon completed construction of a new 30,000 sq ft polyurethane dispersion production department at its Avon Lake, OH facility, which is the largest chemical manufacturing site within Lubrizol's Noveon division globally.

Noveon introduced 16 new coatings resins in 2004 including several wood and plastic coatings products. Sancure® 20041 is a low-VOC polyurethane dispersion for clear wood finishes. CarboSet® PC-21 is a waterborne acrylic copolymer emulsion for automotive interiors and consumer electronics that is designed for use with metallic pigments. Sancure® PC-52 is a "Soft Touch" polyurethane dispersion for automotive interiors. The company developed several new applications for existing technologies.

Noveon also launched several coatings resins for architectural and masonry/specialty construction applications. CarboSet® XPD-2860 is an acrylic emulsion for zero-VOC interior and exterior latex paints that possesses outstanding scrub resistance. CarboSet® 7733 is an acrylic emulsion for low-VOC interior and exterior semi-gloss and gloss paints that also offers excellent scrub resistance. CarboSet® XPD-2790 is an acrylic emulsion for low-VOC primers with excellent tannin and stain blocking. Albuvi® DSA 700, DSA 720, and DSA 760 are styrene acrylic copolymers for masonry coatings that offer excellent elasticity, dirt pick-up resistance, adhesion, and alkali resistance.

In the second quarter of 2005, Noveon will be introducing a new low-VOC, high-solids, waterborne oil-modified polyurethane for clear or pigmented interior or exterior wood coatings. The high solids content of this product (45%) is unique for waterborne polyurethanes and allows for much greater flexibility in formulating with this product.

• The UCB group has signed an agreement with Cytec to sell its Surface Specialties division to Cytec, Inc. for \$1.8 billion. The deal is expected to close in early 2005. To satisfy antitrust regulations, Cytec must divest UCB's amino resins product line.

Ucccoat® UV-curable waterborne resins are new products from Surface Specialties UCB. This line of products combines fast and efficient UV technology with water as a diluent. The low viscosity allows UV waterborne coatings to be applied by spray, roller, or curtain and vacuum coating. This range also includes products that make it possible to obtain a coating that is tack free before UV cure. They



Photo courtesy of Rohm and Haas

offer a choice of excellent properties such as chemical and scratch resistance, flexibility, and adhesion.

Raylok™ 1221 for vacuum coatings has been developed for use with a new technology that is steadily breaking through in the wood market, especially for trims and moldings. Raylok™ 1221 allows the end user to work with 100% UV products without overspray losses. Ebecryl® 8405 is an aliphatic urethane acrylate

that provides outstanding exterior durability, abrasion resistance, and flexibility.

• The Rohm and Haas Company continues to upgrade, debottleneck, add automation/quality monitoring equipment, and implement ongoing improvement programs. The company also introduced several new products for low-VOC architectural paint applications. Rhoplex™ AC-364 and Rhoplex Multilobe™ 300 are 50 g/l VOC flat binders that offer the performance of a 180 g/l VOC conventional flat paint system. Rhoplex EC-3814 is an elastomeric wall coatings binder that has super alkali resistance properties for hot masonry while delivering all the other high performance properties expected from an elastomeric wall coating.

For the future, Rohm and Haas Company is developing and close to launching 50 g/l VOC semi-gloss and high gloss binders. They will deliver the performance of their conventional counterparts, according to Mr. Johnson.

• Uniqema's Priplast polyester polyols are designed to enable formulators to efficiently create stable polyurethane dispersions that offer performance improvements specifically in the areas of low-temperature flexibility, hydrolytic resistance, substrate protection, adhesion to low-energy substrates, ethanol resistance, and UV-resistance, according to the company.

• Silres resins from Wacker Silicones are effective as binders for heat-resistant paints, where the binder must perform well beyond the temperatures at which they are processed. According to the company, paints become increasingly heat-resistant as increasing amounts of silicone resin are included in the complete binder system. Silres resins also provide protection against aggressive weathering effects such as intense UV radiation, temperature fluctuations, and acid rain. [\[7\]](#)